TELEPHONY

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January 5, 1935

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The Flow of Direct Current—First

of Series on Fundamental Principles of Electricity

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Foreword

Most telephone employes are keenly interested in knowing more about the electrical theories back of the operation of certain equipment with which they work. Many of these men have not had the advantages of a technical education and find it difficult to explain certain electrical phenomena which they daily observe. For an answer to their questions, these men have been obliged to turn to elementary books and articles on electrical principles.

Unfortunately for the telephone worker, he finds that most of the illustrations and explanations given have been drawn from the power engineering branch of the electrical industry. He is greatly discouraged to find little with which he is familiar in the book, and ends his studies.

In this series of articles an attempt will be made to present the basic principles of electricity in such a manner that they will be readily understood by the average telephone worker. Instead of using power apparatus for illustrations, modern telephone equipment and circuits will be used wherever possible. Every care will be taken to make the articles easily understood by the worker.

It is hopeless to attempt in these articles to discuss even a small part of the telephone equipment used today, except where this equipment is used as illustrations. The articles will be about *electricity* instead of electrical equipment. Furthermore, only those electrical phenomena usually encountered in telephone work will be discussed. These articles are

designed to provide the reader with certain basic information so that he can, himself, explain the operation of the telephone apparatus with which he works.

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IN THIS ARTICLE the flow of direct current, such as caused by a dry cell, will be considered. Direct current, as the name implies, flows only in one direction, and is distinguished from alternating current which rapidly varies in direction.

The Nature of Electricity: For the purpose of these articles, all electrical effects can be thought of as due to *electrons*. These electrons can be considered as being exceedingly small particles having a definite *negative* charge of electricity.

Although it is somewhat difficult to picture, it seems probable that all matter—such as wires, insulators, or in fact, any object—is composed of these negative electrons and the associated positive *protons*. The electrons and protons are bound together by electrical forces and form the *atoms* of a substance.

It is thought that in a conductor of electricity, such as copper wire, there are a large number of free electrons. That is, although the atoms making up the copper wire itself are composed of electrons and protons, there are among these atoms many electrons which are free, and which move about at random within the wire. In an insulator, such as glass, it is thought that there are few free electrons.

Why a Current of Electricity Flows: Suppose that the ends of a piece of copper wire are connected to the two terminals of a dry cell. One end of the wire will now be positive and the other end will be negative. Since the electrons within the wire are themselves negative, the free electrons will be repelled by the negative terminal. A current of electricity will, therefore, flow through the wire.

Note in particular that the current does not originate in the dry cell. A current of electricity is a flow of electrons. These are already in the wire, and are merely caused to progressively move by the battery when it is connected. As mentioned in a preceding paragraph, an insulator contains but few free electrons, and thus almost no current will flow when a voltage is applied.

These relations are shown in Fig. 1-A, and an important point must now be explained. It is generally assumed in electrical work that current flows from positive to negative, but in the preceding discussion it was stated that the current of electrons was from negative to positive in the wire. The answer to this is as follows:

Before the electron theory was advanced, it was *assumed* that the electric current flowed from positive to negative, and this is the conventional direction and is still used. If the electron theory is correct—and it seems to hold—then the electric current must actually flow in the opposite direction: that is, from negative to positive.

The complete path of the electric current is as follows: From the wire into the positive terminal of the dry cell; through the chemicals of the cell to the negative terminal; and finally, back to the wire.

The cell does not manufacture electrons or the electric current. It provides an electromotive force or voltage which makes one end of the wire positive and the other end negative; and this force or voltage causes the electrons in the circuit to move and a current of electricity flows.

An interesting point may here be raised: Why do not the electrons

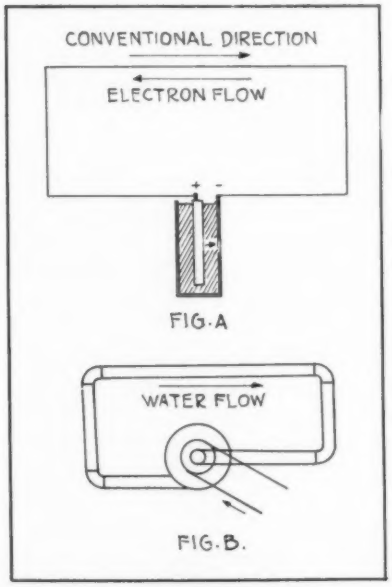

Fig. 1. Copper Bar Showing Dimensions Which Have Influence on Resistance.

accumulate on the positive pole? Why do they flow on through the chemicals of the battery to the negative pole?

To fully explain this point, the exact chemical theory of a cell must be considered. Suffice it to say that *if* the negative electrons *did* accumulate on the positive pole, its potential would become less positive, and soon the current would cease to flow. The chemical actions within the cell keep the electrons flowing on around the circuit, and maintain the terminals positive and negative. The cell, then, acts like the water pump of Fig. 1-B. The pump merely causes the water, which is already within the pipe, to circulate through the pipe.

Thus far, little has been said regarding the opposition or *resistance* a wire offers to current flow. It is well known that whenever an object moves there are friction losses. It is also evident that, in Fig. 1-B, the pump will have to force the water against the friction losses of the pipe. Similarly, when a current of electricity flows, there are resistance losses, and the dry cell of Fig. 1-A must force the electrons through the wire against the resistance losses encountered in the wire. These losses cause heating of the wire.

Ohm's Law: The relations for direct current flow which have just been discussed can be summed up as follows:

Current=Voltage/Resistance. . (1)

That is, the current of electricity which flows through a circuit is directly proportional to the voltage connected across that circuit, and inversely proportional to the resistance of the circuit.

This relation is not one applying to electricity alone; it applies to all other activities as well. Thus, the *result* of any endeavor is directly proportional to the *force* applied, and inversely proportional to the *opposition* encountered.

Equation (1) is known as Ohm's law, and usually written in the form,

$$I = E/R \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where E is the voltage in *volts* applied to the circuit, and R the resistance of the circuit in *ohms*, I will be the current through the circuit in *amperes*.

If each side of equation (2) is multiplied by R, the equation becomes

$$IR = ER/R = E, \text{ or } E = IR \ldots . \quad (3)$$

According to this relation, whenever a current of electricity of I amperes flows through a circuit or piece of apparatus of R ohms' resistance, there will be a voltage drop of E volts across this circuit or device. This can be demonstrated by connecting a voltmeter across a device carrying a direct current. The voltmeter will read the IR product.

If both sides of equation (3) are divided by I,

$$E/I = IR/I, \text{ and } R = E/I \ldots \ldots . \quad (4)$$

Thus, if the voltage drop across a resistor is measured with a voltmeter, and the current through the resistor measured with an ammeter, the resistance can be determined. The relations given by these four equations are of much importance, and should

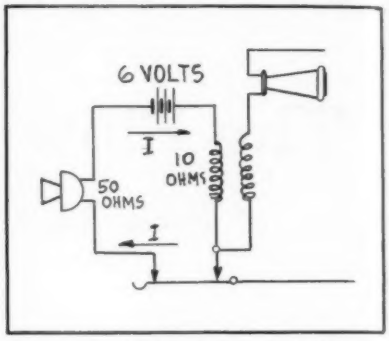

Fig. 2. Illustration Showing Relation Between Areas of Circles and Diameter.

be carefully studied. It should be noted that these relations are for direct current, and do not apply, in general, to alternating current.

Applications of Ohm's Law: To illustrate the use of these relations, the simplified circuit of a magneto, or local-battery, telephone set of Fig. 2 is included. When the receiver is taken off the hook, a (conventional) current will flow as shown by the arrows.

This current flows through the transmitter and the primary of the induction coil in series, and its magnitude will be equal to the battery voltage divided by the total resistance, or $I = E/R = 6/(50+10) = 0.1$ ampere.

If it is desired to find the voltage across the transmitter and that across the primary of the induction coil, equation (3) can be used. Thus, the voltage across the transmitter will be $E = 0.1 \times 50 = 5$ volts, and that across the coil will be $E = 0.1 \times 10 = 1$ volt. That these voltages do actually exist as theory predicts, can be easily proved by connecting a voltmeter across the transmitter or the coil. Such experiments are recommended to the reader.

Power Relations: As has been mentioned, a wire is heated when an electric current flows through it and energy is dissipated. The amount of energy depends on three factors; namely, the voltage, current, and time. It can then be said that in *direct-current* circuits (only),

$$W = EIt \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

When E is the voltage in volts applied to a device, I the current in amperes flowing through the device, and t the time in seconds that the

current flows, W will be the energy dissipated or the work done in watt-seconds. If t is in hours, the value of W will be in watt-hours, a more familiar term.

The rate at which energy is dissipated or at which work is done, is called *power*. Thus, if equation (5) is divided by t, it becomes power; or

$P = EI$ ..... (6)

If the values of E and I are in volts and amperes respectively, the power will be in watts.

The power dissipated in the transmitter and the primary of the induction coil of Fig. 2 can now readily be found. For the transmitter, $P = 5 \times 0.1 = 0.5$ watt. For the primary of the coil, $P = 1.0 \times 0.1 = 0.1$ watt. The power supplied by the dry cells is $P = 6 \times 0.1 = 0.6$ watt, which equals the sum of the power dissipated in the transmitter and the coil.

The power dissipated in a device can also be found if the current and the resistance are known. If the value of E given by equation (3) is substituted for E in equation (6), then

$P = IRI = I^2R$ ..... (7)

The value of the power, P, is in watts if I is in amperes and R is in ohms. For the transmitter, therefore, $P = 0.1 \times 0.1 \times 50 = 0.01 \times 50 = 0.5$ watt. For the primary of the induction coil, $P = 0.1 \times 0.1 \times 10 = 0.01 \times 10 = 0.1$ watt.

Summary: An electric current is not actually made by a battery, but is *caused to flow* by the electromotive force or voltage produced by the battery. This current flow can be calculated by the relation called Ohm's law, $I = E/R$.

Whenever a current flows through a circuit, a voltage drop exists across each element of the circuit as given by the relation $E = IR$; also, power is dissipated in each unit equal to $P = EI$, or $P = I^2R$. Over a period of time the work done or the energy dissipated is equal to this power multiplied by the time the current flows.

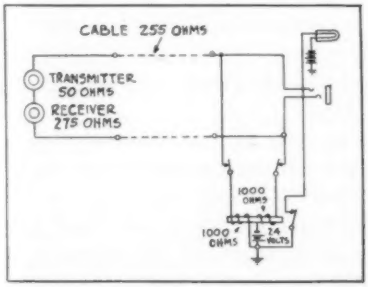

Fig. 3. Connections of Handset Telephone When Signaling the Central Office Operator.

Problem 1: An installer connects a simple handset—consisting of a transmitter and a receiver in series—across a subscriber's line in order to talk to the central office. The line consists of three miles *of wire* of a No. 22-gage cable having a resistance of 85 ohms per mile of *wire*. When the installer connects the handset, the line relay in the central office operates, lighting the line lamp and signaling the operator. The connections are as in Fig. 3, which is reproduced on this page.

Questions: A. Compute the current flowing in the line wires in amperes and in milliamperes.

B. Find the voltage in volts across the transmitter, the receiver, and the line relay.

C. Find the power dissipated in the transmitter, the receiver, the cable, and the line relay. Also find the power supplied by the battery.

D. Add all the voltages in part B, and compare this sum with the voltage applied to the circuit. Account for any differences.

Work out the answers to these questions and hold them to compare with the correct answers. These will be published with the next instalment in this series of articles on electrical fundamentals for the telephone worker.

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Fundamental Principles of Electricity Applied to Telephony

Many of TELEPHONY'S readers will welcome this series of articles on Fundamental Principles of Electricity Applied to Telephony by Arthur L. Albert, associate professor of communication engineering, Oregon State Agricultural College, Corvallis, Ore. The articles have been under consideration and in the course of preparation for a number of months. The series will embrace some 15 subjects dealing with the electrical phenomena usually encountered in telephone work. The articles are specially prepared for telephone workers desiring to secure a knowledge of the fundamental principles of electricity as used in telephony.

Prof. Albert has had practical experience in various branches of telephone engineering as well as in educational work. In addition, he is author of books on electrical engineering and communication, the latest of which is entitled "Electrical Communication." A review of this book was published in TELEPHONY of September 8, 1934. Another book of interest by Prof. Albert was published in 1930 on the subject, "The Fundamental Theory of Electrical Engineering."

After graduating from the Oregon State Agricultural College (a school of engineering and industrial arts) in 1923 with a B.S. degree, Mr. Albert secured employment with the Pacific Telephone & Telegraph Co. in Portland, Ore., as student engineer. In December of that year he was employed as instructor in electrical engineering by his alma mater and has continued to serve on its staff since that time.

In 1926 he was awarded a degree of M.S. (master of science) and in 1929 was promoted to assistant professor of electrical engineering. Last year he was again promoted, to associate professor of electrical communication, having charge of the communication courses offered by the electrical engineering department of the college.

Many of Prof. Albert's summer vacations have been spent in practical telephone work with the Pacific Telephone & Telegraph Co. One summer he spent in San Francisco, Calif., studying telephone methods. Two others were spent in study and observations on inductive coordination. During another vacation he engaged in testing and loading toll telephone cable. During the summer of 1929 he was in charge of an electrolysis survey of the city of Portland, Ore.

Prof. Albert is a member of a number of engineering societies, and has presented papers at their respective conventions on a number of engineering topics. He is well known to "Telephony's" readers through the many articles relating to transmission and testing published during the past seven years.

With his more than 10 years of teaching experience interspersed with practical experience and research work in telephone engineering work, Prof. Albert is eminently fitted to write this series of articles and it is believed that it will be well received in the telephone field.

Wisconsin Convention To Be Held in March

The Wisconsin State Telephone Association will hold its next annual convention at the Park Hotel, Madison, Wis., on March 5, 6 and 7, according to information received from President Walter J. Gallon, of Antigo. Arrangements for an interesting and helpful program are under way.

Regulation and Common Sense

ELEVEN INDIVIDUALS have been invited by Federal Communications Commission to appear before that commission January 21, and show cause why they should be allowed to continue to hold the positions of officer or director of more than one communication company subject to the commission's jurisdiction.

The eleven individuals thus cited include Walter S. Gifford and Edwin F. Carter, respectively the president and a vice-president of American Telephone & Telegraph Co., and John W. Felton, secretary and a director of Western Telephone Corp., an Independent company. The others are connected with telegraph and radio companies.

These telephone men so invited to appear before the commission need feel no embarrassment about the matter; they were duly and officially elected to their respective positions by the stockholders or directors of their companies; there has been no secrecy or concealment about their official positions and, anyway, it is to be assumed that there is nothing personal about the commission's action with respect to them.

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BUT there is a phase of all this that is so important as to be basic, and which interests us very much. It is this: Just what is the theory or concept of telephone regulation that assumes there must be something sinister and against public interest in one man serving as an officer or a director of more than one telephone company, or a telephone company and other companies affiliated with it?

Consider the case of Messrs. Gifford and Carter. Mr. Gifford is an officer and director, and Mr. Carter an officer, of the American Telephone & Telegraph Co. That company for years has owned major interests in various Bell System operating companies and in the Western Electric Co. There is certainly no secret about all that; it has been printed in almost infinitesimal detail in Bell System annual reports and in many other places for years.

These two men and the other officers and directors of American Telephone & Telegraph Co. are responsible to the hundreds of thousands of security-holders of that company for the proper handling of that company's interest in these various affiliated corporations. This means, in finality, that they have a grave responsibility toward the business of all those affiliated companies, since the prosperity of the parent corporation depends upon the prosperity of the subsidiaries. What better, and what more natural, way is there for these men to discharge those grave responsibilities than by direct representation upon the boards of the various company affiliates?

BUT that is only one side of the picture. The other side is that such an arrangement provides for the affiliated companies' directors, and in some cases officers, with broad telephone experience and ability of great value to the affiliate. Admittedly, the officers of American Telephone & Telegraph Co. are men of ability and broad knowledge of and great experience in the telephone business; men who have during their many years of telephone activity made important and valuable contributions to the telephone industry.

The best and most direct way to make this experience available to the various affiliated companies is to have the men possessed of that experience accept, through officerships and directorships of the affiliates, direct responsibility to those companies for their best interests, which means direct and personal responsibility upon these men to act for the good of the affiliated companies at all times.

We use the Bell situation merely as illustration; there are situations somewhat similar in the Independent field. The case of John W. Felton of the Western Telephone Corp. is, we understand, one in point. But the real proposition is not one of any particular company or any particular man; it is one of principle. The question of principle is whether or not it is to be taken as a fundamental concept of telephone regulation that a so-called "interlocking" directorship or officership in the telephone business is inherently sinister and dangerous.

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THE PLAIN fact is that every telephone company needs all the experience, skill, brains and ability available to it. Any proposition that deprives any company of that, and does so especially because of some idea of regulation based, not on the practical facts and needs of the business, but on theory, is bad for the business. Failure on the part of the Federal Communications Commission to respect practical experience will result in the impairment of telephone service; and in time the public will learn who is responsible for such impairment, if and when it occurs.

The application of the rule against so-called "interlocking" directors in the railroad business is one thing, since the railroad business is highly impersonal so far as the user of transportation service is concerned; but telephone service is a personal service, as inherently a part of the home as kitchen utensils, and in the course of time the FCC will find that out.

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IT IS ASSUMED the regulation of telephone companies subject to the Federal Communications Commission is to be constructive regulation. We believe it is the earnest desire of the members of that commission to make it so. We sincerely hope that this

regulation is also to be practical regulation; one which will in a practical and common-sense manner take into account the situation and needs of the industry.

The commission has the power and discretion, under the act, to allow individuals to act as officers or directors of more than one carrier subject to the commission. It is certainly to be hoped that in dealing with the considerable number of individuals who are now members of the corporate bodies of more than one telephone company, the FCC will take into account the corporate and other disorganization that would ensue—and the increase of expense as well as the decrease of business efficiency that would result—if it should take the position that any so-called "interlocking" officership or directorship is not allowable.

Independent telephone companies are vitally interested in, and strongly opposed to, any species of regulation that tears down and impairs the business and service of the Bell System. While the Independent companies are for the most part small, there are more than 6,000 of them and they are largely dependent upon the Bell System for toll connections. Anything that impairs the efficiency of the Bell System impairs the ability of these Independent companies to render to their own customers a completely rounded-out telephone service. Inability to so provide complete telephone service would be disastrous to many Independent companies.

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PROVISION concerning so-called "interlocking" officerships and directorships probably has no place in the Federal Communications act anyway. This section was lifted almost bodily out of the Interstate Commerce Commission act, in which it had been written to apply to railroads where the situation was and is entirely different than that of the telephone companies.

Certainly both public and private interests affected by the telephone industry can be best served by allowing the industry to operate in the way experience has already proved to be the most efficient; and one requisite of that is to provide each telephone company with the utmost of telephone ability, skill and experience available to it.

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REGULATION, to be constructive, must be practical; it must consider facts rather than blindly follow theory. The constructiveness of the regulation of telephone companies by Federal Communications Commission will depend largely upon the degree of practicality with which the commission faces the problems of the industry.

The Federal Communications Commission is thoroughly inconsistent in what seems to be a policy of decentralization of communication operations and at the same time pressing centralization of regulation to the extent of impairing the present jurisdiction of state commissions.

The telephone service of the United States, built up under state regulation, is the best and most comprehensive in existence. Impairment of this service through concentration of telephone regulation in Washington would not go long unnoticed by the millions of telephone users in this country who are accustomed to the best telephone service of any country in the world.

Plant Men Get Together

Coming Events Forecast Themselves

By JAKE, THE LINEMAN.

Happy New Year, Buddies! An' as we start on this brand new year, which has jist bin ushered in, let us stop, look and listen fer a few minutes, an' sorter look back over the past year. For some, it has bin jist another year; another year of disappointments, worries and troubles. For others, it has been a year of progress and happiness.

For some, it has bin a year durin' which they avoided sickness and accidents by living sanely, taking care of their bodies and practicing safety. For countless hundreds, 1934 was a year of ill-health and tragic accidents, brought on by failure to take care of their health and their failure to realize that the price of carelessness is, in 99 cases out of 100, a tragic accident.

Buddies, durin' 1935 let's every one of us remember that "coming events usually forecast themselves." The careless man who goes about doin' his day's work in a careless haphazard fashion is headed fer an accident jist as shure as he is livin'. His own actions forecast the comin' accident.

An unguarded belt or gear, an unguarded buzzsaw, an unguarded manhole, a defective ladder—all warn us of their condition and endeavor to let us know that guards should be placed on them, if accidents are to be avoided. They forecast the accidents which are bound to happen if the hazardous conditions are not corrected.

A foreman puts one of his men on a job which is far beyond his physical ability to perform. After the accident has happened the foreman realizes that the worker had no business being sent out on it.

Were you ever standin' on a street corner when a speeding car "zoomed" past? Remember how you thought to yourself: "That crazy fool will end up in a hospital if he don't slow down?" Shure you have, and why? Because you recognized in that speeding car a dangerous condition which, unless corrected, was going to cause no end of trouble. In other words the comin' accident forecast itself to you.

Buddies, let's resolve that durin' 1935 we are goin' to take care of every condition that is standin' aroun' forecastin' an accident. An' by cracky I'll wager a plug of good chawin' that if every man, who's life job is caring fer the telephones of this old world, would jist keep his eyes open fer the accidents that are always forcastin' themselves, it wouldn't be so all-fired long 'fore Old Man Accident would quit knockin' us for a flock of "hoot owls" whenever he decided he needed a mess of victims!

Wa'll, now what say we take up a few signals. Study them over, they may

help you to see through a condition which is jist standin' aroun' hummin' to itself: "There's gonner be an accident here unless I'm fixed up!"

Safety tells us that the handlines we use should be kept dry, fer wet or damp handlines can conduct electricity in a fashion which kin knock the livin' daylights out of anyone who happens ter be on the end of the line.

A good habit ter get is that of tryin' not ter throw or catch tools or materials while yer standin' on a ladder. Use a handline—it's safer fer yer anatomy.

Falls are dangerous. Remember that, an' the next time yer climbin' an extension ladder, inspect the hooks as youf come to them. It's always better to find a loose hook before it lets go.

Every time you climb a pole, keep yer blinkers on the lookout fer knots and other irregularities on the pole. They can often cause yer spurs to cut out.

Take care before attempting to set a pole. Make shure you've got enough help to do the work safely. Check up on the block and tackle and the winch. If they are not O.K., don't use them.

Your job may not depend upon your ability to find hazardous conditions and report them, but your life and the life of your buddies depends a lot upon the elimination of such conditions.

Wa'll I'll be amblin'. Drop aroun' again soon. We buddies are going to do great things for the safety of telephone workers this year, so don't miss a session of our weekly classes. Until our next lesson remember: "An accident not only knocks the socks off of its victim but it also flattens the family pocketbook."

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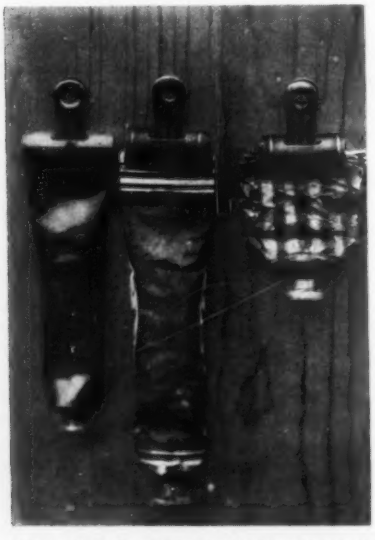
Useful Ideas: Convenient Arrangement for Tubes

The usual assortment of tubes containing glues, cements, and soft solders about the bench can be very handily and conveniently arranged along the wall or edge of a handy shelf, as shown in the accompanying illustration.



Assorted Tubes Can Be Neatly Arranged on Wall by Fastening Paper Clips on Ends and Hanging on Nails.

Using a number of small and inexpensive paper clips to catch and hold the ends of the tubes, they are suspended on a small nail by means of the hole through one of the handles of the clips. The tubes are thus kept entirely out of danger of any mishap and are in this way arranged in an orderly manner, so that the particular one needed at the moment can be instantly selected.

The clips selected for this purpose are quite large enough to snap and fit over the rolled up lead foil of tubes from which most of the contents has been forced out and used.

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The Uneventful Life Of a Trouble-Shooter

By Doc

While working on local trouble I participated in my first large cut-over and thoroughly enjoyed the excitement and efficiency of it. This cut-over from the old to the new system was accomplished without trouble or even the slightest interruption of service.

To the uninitiated this might seem a remarkable feat, as it did to me at the time, but to the trained telephone worker it is just a minor incident in the general scheme, plus plenty of hard work and overtime.

The art of the cut-over has progressed with advancing years until now large city exchanges are cut into service and old ones out, with even more ease, dispatch and less trouble than the small ones in the days of which we old-timers like to brag. At the present time large city exchange cut-overs are truly a work of art and with the repeal of prohibition the feast following thereafter should regain some of the glamor of other days. Many are the headaches I have enjoyed after an old-time cut-over.

But getting back to my first real cut-over: The outside cables going into the old exchange were all half-tapped with cables to the new exchange and connected to the new main frame.

The half-tapping of cables has always played an important part in the cut-over of exchanges of all sizes. This half-tap is a simple bridge or "Y" connection, never loved and much cussed by cable splicers of all times. The wire in the new cable is connected to a conductor of the old cable and a cotton sleeve slipped over it.

After the cut-over has been completed and the splicers are able to resume their duties, the cotton sleeve is slipped and the old conductors cut off and the sleeve replaced over the permanent connection. After all the old half-taps have been removed, the splice can be bound with muslin and a lead sleeve wiped on, which completes the job.

After the installation of the new board was completed and thoroughly tested, the contacts of the cut-off relays were all opened by the insertion of a common wood toothpick to keep the line relays off the line.

These same toothpicks were all tied together with a small, light-weight though strong, cord in order that they could all be removed by one common pull. After the relays were all toothpicked the main frame jumpers were run and soldered in a permanent manner.

This preparation was all carried out with care and carefully checked several times to make sure that everything was exactly right so that a lot of trouble would not flood us after the final switch.

The zero hour was Saturday at midnight and I believe that no National Guard general was ever more nervous the first time his division went over the top than was our beloved plant chief on that memorable night. Midnight Saturday was selected, due to the fact that traffic is usually light at that time, and during Sunday following so that ample time may be had to clear all unavoidable trouble before resuming the normal exchange load Monday morning.

Usually at midnight few connections will be up on the old switchboard. Just a few seconds before 12 o'clock duplicate cords for all then existing conversations are set up on the new switchboard. Should any of the conversations be terminated between the time the connections are set up and the cut-over, no harm will be caused, for they will supervise when the board comes alive and can be taken down in the usual manner.

When the signal "cut" is shouted, stout cords which have previously been dropped behind the heat coils on the old main frame, are pulled, cutting the old switchboard out of service. At as near the same time as possible, the toothpicks are pulled from the new cut-off relays, switching all working lines into the new equipment. The duplicate connections on the new switchboard now carry the existing conversations and any subscribers talking probably did not notice any noise and did not know that anything out of the ordinary had happened.

So, my friends, that is the way we handled my first real cut-over, back in my yesterdays. This same method or a modification of it is still used today, though with refinements of methods which makes somewhat less work and results more positive. I hope that I may enjoy the thrill and excitement of a few more cut-overs, even if only from the sidelines, before my number comes up.

Asks Illinois Commission To Suspend Depreciation Order

ILLINOIS VALLEY Telephone Co., of Streator, asks suspension or modification of Order 137 of the Illinois Commerce Commission requiring the filing of depreciation data. Petition declares that fixing arbitrary percentages for depreciation reserve would prove hardship—and possibly disastrous—to smaller telephone companies. Theoretical rates held illogical. Fixing of definite rates impracticable at this time in view of economic situation and uncertainties as to the future

A PETITION filed with the Illinois Commerce Commission, December 19, by the Illinois Valley Telephone Co., of Streator, Ill., asks for the suspension or modification of general order No. 137 with reference to the filing of depreciation data. This order, issued July 27, 1934, requires all class A telephone companies, whether under the jurisdiction of the Federal Communications Commission or not, to file depreciation rates, and supporting data,. using the same forms of schedule and following the same rules and regulations applicable to the filing of depreciation rates under the Interstate Commerce Commission's order of July 28, 1931, docket 14700.

The Illinois commission's order states that in determining the proper and adequate rate of depreciation of companies not subject to the jurisdiction of the FCC with reference to depreciation, it will exercise its jurisdiction under section 14 of the Illinois commerce act.

The petition of the Illinois Valley company follows in full:

"(a) Said order proposes to fix rates or percentages applicant shall in the future apply to the ledger values of various classes of its telephone property for the purpose of arriving at a composite rate or percentage from which shall be derived an amount applicant shall include in its operating expenses for depreciation.

The plan proposed to be used is that promulgated by Interstate Commerce Commission, which is adopted by Illinois Commerce Commission for this purpose.

Being unable, of course, to know the future, the Interstate Commerce Commission proposes that such percentages or rates shall be estimated, by computing the service value and service lives of the various classes of property in question, using for such purpose a study of the company's history and experience and such engineering and other information as may be available with respect to future prospects.

The result of said plan is to arrive at a composite rate based on system of averages obtained from a combination of records of the past and estimates of the future.

Applicant submits that it would be by only the most remote chance that such a plan could arrive at the actual cost to applicant of depreciation upon its property as a whole or any part of it and that, that being the case, applicant should not be required to assume the hazard involved.

Applicant concedes that a figure can be arrived at by such a method, which figure could be used as a composite percentage for reaching an amount to be charged to operating expenses of a telephone company in lieu of and to take the place of the actual cost to such company of the depreciation of its property, but applicant points out that the percentage so arrived at and used would not be the actual depreciation of said property but would be merely the result of certain calculations used, with the permission or the approval of the regulatory body having jurisdiction, in the place of the cost of depreciation.

Only Large Company Can Afford to Take Risk

Applicant concedes that a very large telephone company operating a large number of telephone properties might safely take the risk of using such an arbitrary percentage in the place of the real cost of depreciation because, in the case of such a large company, while the actual cost of depreciation might be more than the agreed upon percentage in some places, it would doubtless be less in other places so that the proposition might average up satisfactorily over a large area.

The amount of property operated by applicant is, however, too small and applicant's revenues are too small to allow it to take such a risk, because if the amount resulting from such an arbitrary percentage should turn out to be less than the actual cost of depreciation of applicant's property, then applicant's property would be consumed in the service of the public without compensation and applicant might and no doubt would come to serious financial grief thereby.

On the other hand, if such an arbitrary percentage resulted in an amount in excess of the actual cost of depreciation to applicant, injustice would thereby be done applicant's patrons; and applicant does not wish to take such advantage of its patrons.

It will be observed that the order of the Interstate Commerce Commission dated July 28, 1931, as amended by the supplemental orders establishing a new system of accounts, does not deal with the question of the actual depreciation to be charged to expense, but provides a method of setting up a reserve and making provision that if and when, at some future time, property is retired, it shall be charged to this reserve.

The Interstate Commerce Commission did not comply with the act of Congress, but instead, merely provided that an admittedly estimated sum to be credited to reserve should be charged to expense instead of providing that a reserve should be set up against which the true expense, when ascertained, should be charged. The charge to the company's expense should be made only as a result of the ascertainment of depreciation actually sustained.

Prior to that time, the status of the monthly or annual credit to the reserve is, as has been pointed out by many economists and accountants, simply an appropriation to a reserve from gross profits or from surplus arising before creation of reserve for depreciation. Until the facts are ascertained, the reserve is merely an appropriation from surplus to provide for losses accrued and accruing, but the amount of which is not yet ascertained.

(b) It is impossible to accurately cal-

culate in advance the cost of depreciation on any part of a telephone plant. Depreciation occurs by reason primarily of three elements: Wear (sometimes also called wear and tear, deterioration, or decay), obsolescence and inadequacy.

If it were possible—which it is not—to calculate in advance the cost of wear of plant and equipment (which would mean that it would be necessary to know in advance the exact service life of every item of plant, and the exact condition and salvage value of it when finally removed from plant), it would still be impossible to arrive in advance at the cost of obsolescence and inadequacy.

Obsolescence arises from changes in and advancement of the art; these are beyond the control of any telephone management. Inadequacy arises from changes in the needs and demands of the public served; these are likewise beyond the control of any telephone management.

These two items, indeterminable by any telephone management or by anyone in advance, constitute a large part of the cost of depreciation. That part of the cost of depreciation which arises from wear is diminished or increased according to the manner and degree of the maintenance of the property. But no amount of maintenance of plant in existence can forestall or prevent the cost of retirement of parts—and often large parts—of the plant, because improvements in the art have made them obsolete or changes in the needs of the subscribers have made them inadequate.

The provision for obsolescence is, in fact, provision for progress; and progress—i.e., the constant improvement of the art—creates a constant destruction of the present values of telephone property.

The development of the common battery switchboard destroyed a large part of the value of the countless magneto switchboards which had, through public demand, to be retired long before their period of usefulness had expired. The development of the automatic telephone likewise destroyed the value of and caused the retirement of many manual switchboards which otherwise would have remained in service years longer.

The same condition exists throughout the whole telephone plant, as is instanced by the substitution of aerial cable for open wire, of underground for overhead construction, and so on.

Example of Obsolescence

"A current illustration is the rapid development during the past few years of entirely new types of telephone instruments, which new types are fast rendering obsolete hundreds of thousands of telephones standard in type only a few years ago. This destruction of present values of telephone property is constantly going on through the rapid development of the art—and who would have it otherwise?

It is in keeping with the spirit, aims and ideals of America that the art of telephony should improve and advance as rapidly as inventive genius and manufacturing methods and facilities make that possible.

The theory that the depreciation charges on any part of a telephone plant can be fixed at some certain rate or amount which will provide for all the exigencies of the future, is based upon the belief that some given average per year can be arrived at in advance which will, over a period of years, make full and adequate provision for all the company's future needs as to wear, obsolescence and inadequacy. This theory is untenable.

While it is true that, given some specific policy as to maintenance, it might be possible to forecast within reasonable limits the percentages or amounts needed to provide against wear, it is utterly impossible to so provide in advance against the elements of obsolescence and inadequacy, since it is impossible to foresee at any time the amount or the particular parts of plant that will need to be replaced in any given period in the future because of changes in the art, or inadequacy.

The future cost of obsolescence and inadequacy is as indeterminable today as the state of the weather a long time in the future.

(c) The plan of Interstate Commerce Commission to fix rates now to cover the future depreciation of telephone property is, on analysis, even more complex and absurb than the foregoing would indicate.

Not content to require the telephone company to guess at one rate which, applied to the whole of its plant, would presumably provide, as a part of operating expenses, an amount to cover the cost of the depreciation of the whole property, that commission divides the property into 12 different parts, and requires the telephone company to make 12 different guesses; that is, to guess a rate that should apply to each of them.

These rates so arrived at are then applied to their respective portions of the plant, and from the whole a composite rate is reached which is applicable to the whole of the plant.

Such is the manner, under the proposed plan, by which would be determined the rate of depreciation upon its property that the telephone company would be allowed to charge to its operating expenses, and upon which it would need to rely for the cost of perpetuating its property.

The foregoing is, however, only a part of the complexities of the scheme. Under the plan of the Interstate Commerce Commission the telephone company is not allowed even the privilege of offsetting one bad guess made by itself, or by the commission, against another bad guess. On the contrary, the plan provides that each of the 12 separate parts of the plant shall have its own separate reserve for future depreciation.

An unnecessary surplus arising in one of the 12 reserves because of the inability of either the company or the commission to read the future correctly, cannot be transferred by the telephone company into another reserve where, because of the same lack of ability, a deficit may exist.

Scheme Declared Fantastic

"Applicant submits that this scheme is so absurd as to border on the fantastic. It multiplies by 12 the impossibilities of this whole idea of predicting the future cost of depreciation. Who can have the prevision and the foresight to determine now or at any time just what part, and just how much of that part, of a telephone plant must be retired in the future, and when, and under what circumstances, because of wear, or obsolescence or inadequacy?

What will be the next improvement in the art of telephony? When will it come, and when must it be adopted by a given company? What part of that company's then existing plant will it replace? How and when, and where will the needs and demands of the public served change, and to what extent; and what changes will that require in the then existing plant of any telephone company?

How much shall the company allow in its guess for replacement of subscribers' sets because of developments of the art, for changes of poles, wires and cables because of inadequacy, for replacement of central office equipment because of obsolescence created by some development today unknown?

Such questions could be extended indefinitely. They disclose the entire lack of practicability in this whole scheme of applying an unlimited amount of theory to a proposition that, like many other questions in any business, must in finality be dealt with on a commonsense, practical and business basis.

(d) Depreciation charges for small areas and small owners should be flexible and adaptable to the changes—climatic, economic and social—that are taking place, or have taken place, within the community served. An intensely practical judgment must be brought to bear in setting aside the amount reserved for depreciation, based upon thorough consideration of the company's business and its recent experience and operation, both physical and financial.

(*Continued on page* 21)

(*Continued from page* 16)

As applied to small owners and operators, this is decidedly an extremely practical matter. Who can better judge of what the depreciation charges for a year should be than the officers and directors of the small company? They at the end of the year, can review the year's operation and take note of the condition of the company's plant and the changes that have been taking place in that plant during the year and can consider the financial results of the year's operation.

Certainly, some formula fixed academically far in advance to determine the amount of depreciation cannot be as satisfactory as a method that has that flexibility which would permit adjustments from time to time at short intervals as the operations of the particular property require.

Depreciation for moderate-sized telephone properties can best be provided by making appropriate monthly charges to operating expense or as appropriations to surplus and corresponding credits to the depreciation reserve; and at the end of the year adjusting the same, if necessary, after consideration of the company's actual experience as developed during the year and its added knowledge of its property and the changes that have taken place and are taking place therein.

This company (and others of like size) is obliged to run its property on the basis of actual results experienced in the actual area and territory served for any given period, regardless of the theoretical estimates based on averages for relatively long periods as applied to large properties.

To adopt theoretical estimates, particularly for small properties, would mean the probability that slight changes of the actual from the estimated average would bring the income statements for any year to a misleading result, with the consequent upsetting of annual balance sheets and adversely affecting finances.

(e) Order 137 should be set aside because this commission does not have the authority to fix percentages of depreciation and require them to be charged in the future conduct of a telephone company's business, particularly independent of rate hearings and the necessity therefor.

This commission, through long years of its administration, has never attempted to fix depreciation percentages for the future in the manner now attempted without relation to rates charged for service. The commission has thus impliedly construed the statutes of this state as not granting to the commission any such authority.

The jurisdiction of this commission over depreciation charges is and should be confined to estimates for use in rate cases when the particular property of a telephone company is under the scrutiny of the commission, and the operating expenses, including depreciation charges, and the needed revenues with which to defray these expenses may be considered at the same time.

In fact, there is good reason to believe that it is the intent of the Illinois commerce act that such should be the procedure, since the legislature has by recent enactment practically so interpreted the statue by providing, in the amendment adopted to paragraph 5 (chapter III (a)) of the revised statutes of 1933, that in the investigation of rates the commission must allow "reasonable deductions for depreciation." It is a fair assumption that by a "reasonable deduction" is meant one that is reasonable at the time the rates are investigated.

If, therefore, the question of the reasonableness of the allowance for depreciation must be gone into by the commission at the time of the investigating or fixing of rates, and must be determined at that time, what can be the value of theoretical rules for the fixing of depreciation rates to be used month by month in the company's accounts, when the same may or may not have resulted in a deduction for depreciation that is reasonable at the time rates are investigated or fixed, and since they must be examined into at that time to determine if they are reasonable?

HESITATION

By MISS ANNE BARNES,
Traveling Chief Operator, Iowa Independent Telephone Association,
Des Moines, Iowa

If we hesitate in making a decision when we must choose between two or more courses confronting us, we are not considered vacillating; but if we must make a choice between doing or not doing a certain thing and seem reluctant to decide, people may lose confidence in us. They cannot depend on our decision because we have been so uncertain about what to do.

Perhaps, the person who can be least trusted, especially in business, is the one who fluctuates between two stands, one of which he must take, and finally makes a choice of one without knowing whether it is for the best or not.

Someone has said that having two minds is as confusing as twins. But, I think having only one mind and not training it to make a decision, without asking someone's advice, is worse. Such folks seem to be always lost in a fog of bewilderment when it comes to making any decision. They are a great worry in business where people are expected to stand on their own feet.

I am reminded of a story of a young woman who was to receive a very rare gift if she were able to carry out certain instructions to the letter: She was to go through a field of corn without once pausing, retracing her steps, or wandering to the side and choose the ripest, largest ear she could find.

How easy it seemed—almost like a joke. So, on the appointed day, she started her journey through the field. But she soon realized that choosing would be difficult as there were so many fine-looking ears of corn all about her. Should she pluck one of these magnificent ears or should she see if there were any better ones farther on, she kept asking herself? But she could not make up her mind.

As she journeyed on she thought the ears seemed smaller than many of those she had passed, but she could not go back to compare. Besides, she was not sure. Maybe, she would come to larger and more perfect ones, like those she had passed a while ago, if she did not make her choice now. She would wait a while. Before she realized it the other side of the field was in sight, so she came out with no ear of corn. Then she realized what *indecision* had cost her.

Let that be a lesson to us.

To adopt and fix for the future by theoretical estimates the amount which must be set aside out of income for a depreciation reserve in one proceeding and to establish rates from which this income is derived in an entirely different proceeding is illogical and will result in grave injustice.

Revenues of the company necessarily have controlling influence on the ability of the company to provide depreciation reserves; and, in fact, some authorities suggest the use of revenues as a basis of calculating the amount for depreciation charges. In the Public Utilities Fortnightly of November 8, 1934, Luther R. Nash refers to this phase of the matter as follows:

The use of revenue as a basis of percentage appropriations for retirements has been criticized by various commissions and others as being illogical. It is claimed that a percentage of physical property is more accurate, for the reasons that physical property continues to depreciate regardless of the amount of revenue derived therefrom. Such contention would be true if all property were retired because of physical deterioration.

By far the major part of all retirements is, however, due to non-physical causes and it is not difficult to show that revenue has a most important bearing. If revenue increases rapidly owing to added volume of the business, it may be necessary to provide new facilities and to abandon old units. Revenue is, therefore, a very close guide to inadequacy.

Similarly, obsolescence depends upon revenue because without the surplus arising from increased revenues and general prosperity associated therewith, improvements would not be made. Furthermore, supersession, including retirements, due to public demands, depends upon community prosperity which is paralleled by utility revenues.

If rates are increased to take care of higher cost of service, there is usually a similar increase in construction cost and a higher future cost of retirements for which the increased revenue provides. On the whole, therefore, percentages of revenue tend automatically to adjust retirement reserves to retirement needs.

(f) In this connection it has been further suggested (and the applicant understands the law to be) that the commission does not have the constitutional right to require the company in the management of its properties to incur the burdensome expense necessary to make the studies and supply the estimates and supporting data as to future depreciation percentages that have been ordered furnished in this independent proceeding.

Companies, such as this applicant, do not have even for normal times, data readily available or experience sufficient to make intelligent answers to the questionnaire of the Interstate Commerce Commission which is put forward by the Illinois Commerce Commission in this matter; and any answers which this company might make would be merest guesses and of little or no value in determining what the percentage of depreciation charges should be for any considerable period of time in the future.

To be of any value whatever, the response of this applicant to these requirements should be made after much detailed study, which would necessarily entail relatively large expense. During these lean years of operation this applicant respectfully requests the commission not to require—even if it has the right to do so—that companies such as this applicant be put to such expense, and further that the accounts of the company should not be warped out of balance by any order fixing a percentage inexorably for any given time.

A procedure which so circumscribes the officers and directors of a small operating telephone company as to prohibit them from taking note of actual conditions, deprives them of the right of management which is guaranteed to them by the Constitution.

It is well-settled by the decisions of the courts that the commissions have no right to invade the field of management. The reason for this rule rests fundamentally upon the proposition that the state has not assumed management of telephone properties and is only concerned in obtaining for patrons efficient service at reasonable rates.

Any regulation of depreciation charges should certainly not extend beyond this purpose and function of the commission. All orders of the commission, therefore, with respect to depreciation charges should allow sufficient flexibility as not to hamper the small owners of telephone property in their efforts to maintain their properties and at the same time render efficient service.

The company, however, wishes to cooperate with the commission in every way and stands ready at an appropriate season, when normal times return, to furnish any data, records, memoranda, or any other information which it has available that will assist the commission in this matter.

Obviously, it is difficult to the point of impossibility for the Interstate Commerce Commission to hold separate hearings for each of the many thousands of telephone companies in order to come to an adjudication by legal process. This same difficulty, with respect to the several hundreds of telephone companies in Illinois, would face the Illinois Commerce Commission, should it undertake to arrive at rates of depreciation through legal process.

It appears, in consequence, that the Interstate Commerce Commission, and now this commission, has sought to shorten this process of official adjudication by getting each company to agree to a basis or starting point and, in effect, allowing each company to set its own starting point.

This seems fair on the surface and undoubtedly no unfairness was intended, but we might as a result have a very awkward consequence for a time, which would result in the case of the applicant running at little or no profit being compelled to either voluntarily set its depreciation at a much lower figure than it could afford over a long-pull future, or alternatively it would be obliged to show a bookkeeping loss, upsetting financial arrangements and upsetting dividend flows or payments of interest, etc.

(g) Because of the prevailing abnormal economic conditions which have embarrassed the telephone industry, particularly the smaller companies, during the past several years, it will be especially inappropriate and burdensome, and in some cases very disastrous, to fix or attempt to fix and apply percentages for depreciation charges that were applicable only, if at all, during normal conditions.

Normal Percentages Inapplicable at Present

The percentage of depreciation charges based on operations in normal years are entirely inapplicable under present economic conditions now prevailing, because if applied, such percentages would, as previously stated, lead to financial embarrassment in many cases, result in operating deficits and bring about consequent necessity of increasing rates for telephone service—an action which might otherwise be inadvisable at this time and therefore to be avoided. The telphone industry has been confronted during the past few years of depression with an experience heretofore unknown to industry.

Since the industry got under way, in about the year 1880, there had been a constant and consistent growth of the telephone business. Operators of telephone property had come to believe that this sort of thing would continue for many years, and all calculations with respect to operating telephone properties were based upon the assumption that such conditions of growth and stability would so continue.

The prevailing depression reversed this process; and instead of growth, the companies have, during the past few years, experienced a steady and devastating decline in business. All calculations as to depreciation charges based upon the assumption of continued growth must, therefore, be revised and modified so as to take into account the reverse of these conditions.

Flexibility, which formerly was not needed, must now be allowed in connec-

tion with fixing these depreciation percentages. Details of setting a percentage for each primary plant account, and in this way arriving at a composite percentage based on the experience entirely different from that now prevailing, are misleading and are liable to result in a warped condition of company accounts.

(h) Numerous authorities could be cited on various questions at issue in this matter. It is clear that the same rate of depreciation cannot apply alike to all telephone companies. On this question Commissioner Joseph B. Eastman of the Interstate Commerce Commission said, in a report by that commission:

All parties to this proceeding concede that uniform rates of depreciation cannot be established for all telephone companies. There is entire agreement that rates of depreciation for the same classes of property differ materially, depending upon conditions under which the particular company operates, and that if we are to prescribe rates of depreciation, as the statute contemplates, a careful study must be made of the situation of each individual company.

Also, in the telephone depreciation case, reported in 118 I. C. C. 372, Commissioner Eastman said:

Upon one proposition all parties are agreed, and that is that the service lives of the same kind of property vary widely in different companies. It is impossible to lay down any general rule which will apply in the case of all companies, owing to the different conditions which surround the use of property in each individual case. . . . There seems, indeed, to be no way in which prospective service life can safely be estimated through an automatic or mechanical process . . .

On the question of the inapplicability of some fixed average to be applied year by year, Justice Brandeis, in a dissenting opinion in the Baltimore Gas case, said:

And even where it is known that there has been some lessening of service life within the year, it is never possible to determine with accuracy what percentage of the unit's service life has, in fact, been so consumed. Nor is it essential to the aim of the charge that this fact should be known.

The main purpose of the charge is that, irrespective of the rate of depreciation, there shall be produced, through annual contributions, by the end of the service life of the depreciable plant, an amount equal to the total net expense of its retirement. To that end it is necessary only that some reasonable plan of distribution be adopted.

Since it is impossible to ascertain what percentage of the service life is consumed in any year, it is either assumed that depreciation proceeds at some average rate (thus accepting the approximation to fact customarily obtained through the process of averaging) or the annual charge is fixed without any regard to the rate of depreciation.

What Will You Do With the New Year?

Now we take up the new volume of 1935 with its clean, white, spotless pages. What will we find written there one year from today? Will it be a story of success, inscribed in the clear firm hand of courage and faith; or will it be one of failure in the crabbed hand of selfishness and fear?

Let the 1935 story of telephony be one of determined effort to fight for and win back that which we have lost and let it be written, from beginning to end, in the bold hand of faith and confidence in our country, our industry, our fellowmen and ourselves.—PENNSYLVANIA STATE TELEPHONE & TRAFFIC ASSOCIATION BULLETIN.

Expert opinions based on other expert opinions and then a composite opinion of them all are of no value in law as evidence, and that is about what the estimates for depreciation come to for small companies. Chief Justice Hughes refers to this matter in the Illinois Bell case, in the following language:

Because of the many different classes of plant, some with long and some with short lives, some having large salvage and others little salvage or no salvage, and because of the large number of units of a class, the company employs averages; that is, average service life, average salvage of poles, of telephones, etc. . . .

If the prediction of service life were entirely accurate and retirements were made when and as these predictions were precisely fulfilled, the depreciation reserve would represent the consumption of capital, on a cost basis, according to the method which spreads that loss over the respective service periods. . . .

The calculations are mathematical, but the predictions underlying them are essentially matters of opinion, that proceed from studies of the "behavior of large groups" of items. These studies are beset with a host of perplexing problems. Their determination involves the examination of many variable elements and opportunities for excessive allowances, even under an accurate system of accounting, are always present. *The necessity of checking the results is not questioned. The predictions must meet the controlling test of experience.*

John E. Benton, general solicitor of the National Association of Railroad & Utilities Commissioners, in his argument before the committee of Congress, with respect to the federal communications bill, stated:

Accurate determination of the proper amount to be allowed for depreciation can only be determined in a particular case by careful investigation such as is made in a rate case. . . .

In every rate case, any commission should give consideration to the value of property and give consideration to how such should be allowed in the way of a fair rate of return and how much should be set aside for depreciation, as new questions to be determined upon the evidence of the particular case at the time of the determination of the case.

General order 137 of Illinois Commerce Commission seems to be based upon the assumption that the theory of depreciation charges adopted by the Interstate Commerce Commission in its order of July 28, 1931, is correct and is applicable to small companies as well as large, and is, therefore, to be followed blindly without consideration at the hands of Illinois Commerce Commission and without giving companies subject only to the jurisdiction of the latter commission an opportunity to present at a hearing their views as to whether this theory of depreciation should be adopted.

Application of Theory of Depreciation

Applicant asserts that this theory should not be adopted with respect to small companies; that it is inapplicable to them for the reasons stated herein, and that its application to them may well be disastrous to them, and that it would in any event be unfair and unjust to either the company or to its patrons.

Applicant further asserts that Section 14 of the Illinois commerce commission act giving the Illinois Commerce Commission authority to determine and fix rates of depreciation for utilities subject to said commission's jurisdiction, does not require that said depreciation rates be determined and fixed at a time other than the time rates for service are investigated or fixed; and that, in fact, the 1933 amendment to said act, requiring that the commission allow reasonable deductions for depreciation at the time rates for service are investigated or fixed, not only implies that the depreciation rates are to be fixed at that time, but also makes it necessary that rates of depreciation be examined into at that time.

It is clear, therefore, that it is an unnecessary, and consequently a wasteful and expensive duplication of effort, to require that the rates of depreciation be fixed at any other time.

Applicant further asserts that even if it were desirable for any reason to determine and fix depreciation rates at a time other than that when rates for service are investigated or fixed, it would be impracticable to do that now because of the present unprecedented situation of the telephone industry caused by the depression, and the consequent and obvious uncertainties of the future with respect to said industry."

News from Commissions and Courts

Class A Questionnaire On Use of Free Service

The telephone division of the Federal Communications Commission, in order No. 6-A, handed down December 20, requires all class A telephone companies subject to the communications act to file duplicate answers to the supplemental form quesionnaire attached thereto for the year ending December 31, 1934, relative to the use and issuance of franks and passes or the granting of free service or service at less than regular rates in interstate and foreign communication.

It is further ordered by the telephone division that effective January 1, 1935, all class A telephone companies shall keep their records in such a manner as will enable them to furnish the commission with the information requested in this questionnaire for any month or months subsequent to December, 1934, as may be requested by the commission.

Class A companies are further ordered to retain in their possession all original records containing the data used in compiling the response to this questionnaire until such time as the commission shall specifically authorize the destruction thereof.

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The Changing Status Of the Small Towns

After two hearings of the application of the Lincoln Telephone & Telegraph Co., Lincoln, Neb., for authority to close the small exchange at Saronville and serve the 30 patrons left out of 172, who were listed four years ago, from either Clay Center, Harvard or Sutton, the Nebraska State Railway Commission has ordered that a further hearing be held at Saronville at such time as Commissioner Bollen appoints.

The company presented, as the law requires, more than 75 per cent of the signatures of patrons and of those who were patroas within the last six months, but the commissioner expressed dissatisfaction with the form of the consent petition signed.

He suggested that the company keep the exchange open for that part of this year necessary to determine whether a good crop will bring back the lost patrons in sufficient numbers to justify the continued maintenance of the exchange. In 1933 it lost $900, and in ten months in 1934 the deficit exceeded $1,600.

General Manager Agee said that the trouble with this plan was that when the farmers' income is restored there is no assurance that all of the former rural patrons at Saronville would desire reconnection with that exchange. This situation, he says, arises out of the changed status of the small town brought about by the general use of the automobile, following the construction of a statewide system of good roads. The farmer buys a car and his family wants to enjoy its use.

This means that they take more and more trips to the county seat or larger towns within reach, where they form new buying connections, find all-week movies, better stocks of goods and more attractions generally. The development of high-school athletics lures farmer boys to those towns large enough to produce worthwhile football teams.

Mr. Agee says that the combination of good roads and the automobile has even affected the small-town churches. People get in their cars and go to the larger towns where are the better ministers and where more regular and frequent services are held. In many instances this means a transfer of membership to where the financial burden is less than in many small-town churches.

The net result of all of this, said Mr. Agee, is that these farmers, with new associations and new interests, desire service with the larger exchanges in the towns to which they have transferred those interests. He doubts very much whether any considerable number ot those formerly connected with the Saronville exchange would ask for service after they get into a position where they can pay for it. In fact, a number had asked for such new connections, and so far the company had refused to do so.

Commissioner Bollen declined to be moved from his position that the present economic situation is responsible for the disappearance of so many patrons, and insisted that some means be worked out by which the Saronville exchange can be kept open. At his suggestion, a hearing where the patrons and prospective patrons could be given an opportunity to express their opinions and desires, will be arranged later.

"TELEPHONY" INDEX READY

The index for Volume 107 of "Telephony," which was completed with the issue of December 29, 1934, is now ready for distribution among those who keep complete files.

All of the important articles which appeared between July 7 and December 29, 1934, are listed in this index. It will be supplied free of charge to those making application.

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Arguments on Wisconsin Bell Rate Injunctions

Arguments on the Wisconsin Telephone Co. rate case scheduled in federal court at Madison for January 7 have been set over to January 28.

With four judges expected to sit at the hearing, the case will present an unusual occasion. Two injunctional proceedings brought by the Wisconsin Telephone Co. on one-year emergency rate reductions ordered by the Wisconsin Public Service Commission have been heard in federal court by three judges. Judge Patrick T. Stone, who had not been appointed to the district bench when the first arguments were heard, sat with two of the original three on the second action and also will sit at the hearing late this month.

Other judges figuring in the case include J. A. Geiger, Milwaukee, and Louis FitzHenry and George T. Page, Chicago.

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Commission to Investigate Wires Crossing Tracks

The Nebraska State Railway Commission has issued an order for an investigation of the situation with respect to wires of electric, telephone and telegraph companies crossing railroad tracks in the state, this being done on the suggestion of Mark T. Caster, plant superintendent, Lincoln (Neb.) Telephone & Telegraph Co. and chairman of the state committee on which all such companies are represented.

The legislature in 1915 gave the commission power to put a code into operation, and two years later greatly enlarged these powers, as at that time the development of electric transmission lines was in swift progress. This law

(*Concluded on page* 32)

GRAY
TELEPHONE PAY STATIONS . . . . . .

. . . A SOURCE OF ADDED REVENUE

GRAY TELEPHONE PAY STATIONS

In any public place, be it hotel lobby, drug store, cigar store, restaurant, or any one of a dozen other public places common in every town and city in the United States a telephone pay station can be profitably installed by the local telephone company. The telephone in this modern day is a necessity; people frequently need its service when away from home and thus, pay stations conveniently and conspicuously located in public places will attract many customers willing to pay for their use.

Gray Pay Stations are standard (in fact used exclusively) throughout the telephone systems in this country and many others. Rightly so, too, for they are accurate and dependable, collecting the money at the time the service is rendered and thus providing a safeguard against fraud.

There is a model to meet the requirements of your company and locality.

Gray Telephone Pay Station Co.
HARTFORD, CONN.

Order Direct or Through

AMERICAN AUTOMATIC ELECTRIC SALES CO., Chicago
KELLOGG SWITCHBOARD & SUPPLY CO., Chicago
STROMBERG-CARLSON TELEPHONE MFG. CO., Rochester
Or any other telephone supply house

LEICH
No. 47-A RINGING CONVERTER

Guaranteed to produce satisfactory telephone ringing current directly from the Commercial Alternating Lighting Circuit.

The ideal converter for the average Central Office or the smallest P. B. X.

Unaffected by fluctuations of the power current.

Fireproof Construction.

No radio interference.

Three current carrying contacts made of the best contact material obtainable insures long contact life and minimum operating and maintenance cost.

ORDER ONE ON 30 DAYS' TRIAL

Idling power consumption not in excess of eight watts.

LEICH ELECTRIC CO. » GENOA, ILL.

"The first to produce a successful vibrating type ringing converter to operate from alternating current."

Here and There in the Field

P.B.X. Instruction at Canadian University

The latest ideas in the operation of telephone switchboards have been made an important part of the curriculum for students in secretarial science at the University of Western Ontario in London, Ontario, Canada. Miss M. K. Vincent, chief telephone operator at this seat of learning, is conducting inclasses in private branch exchange instruction.

Before undertaking her new duties in this regard, Miss Vincent completed a special course of training with the Bell Telephone Co. of Canada at Toronto, the company's headquarters for its western area. Plans are going forward for the early installation of a practice switchboard at the London university for the use of the students.

• • •

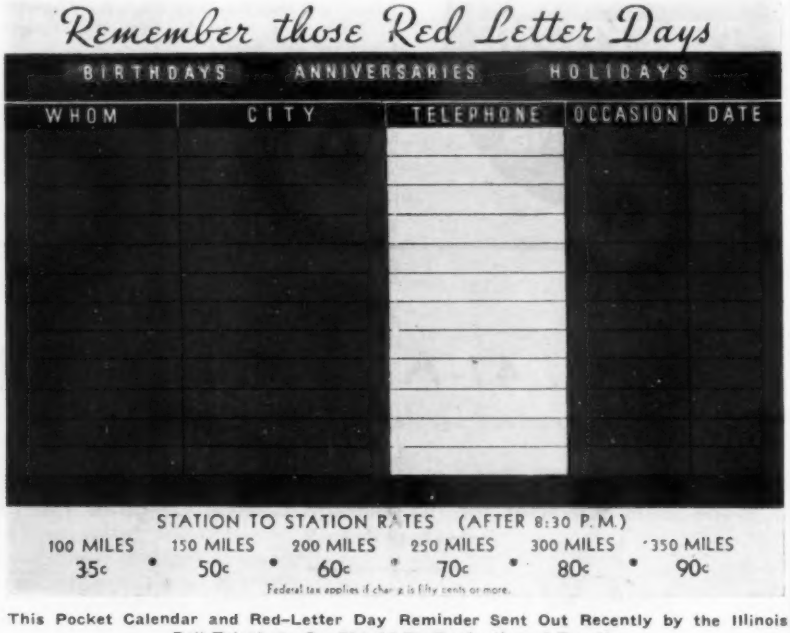
Novel Solicitation of Long Distance Business

On this page appears a facsimile of the inside of an attractive pocket calendar and "red letter day" reminder, distributed last month by the Illinois Bell Telephone Co. The card is folded in the center to a size of approximately 2¼ by 3½ inches, convenient for carrying in one's purse or bill-fold.

The front cover of the card, which is attractively printed in yellow, red, orange and black, bears the title "The Thoughtful One." Below is this explanatory paragraph: "We all like a thoughtful greeting on some occasion—birthday, holiday or anniversary. This little pocket reminder will help keep you from forgetting the very ones who never forget you and yours."

On the back cover of the card is reproduced a complete calendar for the year 1935, with national holidays indicated in red letters. At the top of the card are these words: "For Correct Time, Call Cathedral 8000." And by the way the Cathedral exchange in Chicago is the only exchange in the city with one number—Cathedral 8000.

This clever solicitation of long distance as well as local telephone calls should be productive of results.


Remember those Red Letter Days
BIRTHDAYS ANNIVERSARIES HOLIDAYS
WHOM
CITY
TELEPHONE
OCCASION
DATE
STATION TO STATION RATES (AFTER 8:30 P.M.)
100 MILES 35¢ • 150 MILES 50¢ • 200 MILES 60¢ • 250 MILES 70¢ • 300 MILES 80¢ • 350 MILES 90¢
Federal tax applies if charge is fifty cents or more.

This Pocket Calendar and Red-Letter Day Reminder Sent Out Recently by the Illinois Bell Telephone Co. Should Be Productive of Results.

• • •

Child's Interest in Telephone Prevents Fall

A mother's quick thinking, and a child's interest in the telephone prevented what might have been a serious accident in New Britain, Conn., according to an incident related recently in the Southern New England Telephone Co. Bulletin.

While in the back yard, the mother looked up and, to her dismay, saw her child making an effort to get out of an open second-story window. Thinking quickly, fearing to see the child tumble to the ground any minute, and realizing that a sudden display of emotion on her part might hasten the child's fall, the mother called:

"Will you answer the telephone for Mother?"

The child accepted the mother's suggestion, got down from the window and back to the floor. The mother rushed upstairs, thanking her "lucky stars" that her child was unhurt.

She should have thanked her good judgment. When the child showed an interest in the telephone and occasionally attempted to answer it, the mother, thinking constructively, taught the child the proper procedure so that what started out as a "cute trick" became a useful accomplishment in which the child took such pride as to divert it from mischief that might have had serious results.

• • •

Bell's New Press Bureau in Washington, D. C.

Edwin F. Hill, publicity director of the Chesapeake & Potomac Telephone Co., Washington, D. C., has been placed in charge of the new 24-hour press information service recently established in Washington by the American Telephone & Telegraph Co. The bureau will

WHITALL TATUM INSULATORS

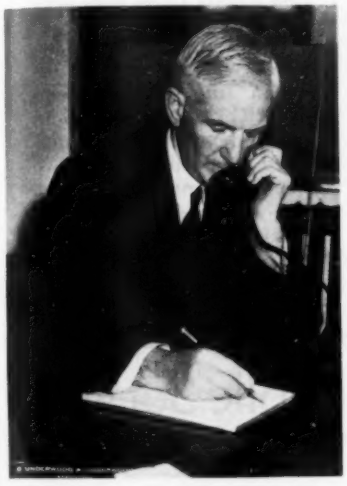
USED for years on telephone, telegraph, railroad and lighting company distribution lines . . . a dependable source of supply for uniform, well-designed transparent glass insulators.

WHITALL TATUM CO.
Glass Manufacturers Since 1836
225 Varick St. New York

provide newspaper reporters and correspondents accurate, first-hand information on the company.

The accompanying photograph shows Mr. Hill at his desk "ready for business."

The new information bureau was opened shortly after the announcement



Edwin F. Hill, Veteran Telephone Contact Man of Washington, D. C., Who Has Been Placed in Charge of New 24-Hour Press Information Bureau of the American Telephone & Telegraph Co. in Washington.

by the Federal Communications Commission of its intention to thoroughly investigate the financial structure of the A. T. & T. Co. and its relations with subsidiary and affiliated companies. The hearings in the investigation are scheduled to start about February 1, being delayed because of the necessity of securing funds for it from Congress.

• • •

England's Telephone Conference Service

Telephone conference service is taking a strong hold in Great Britain, as evidence, the far flung use of this facility recently by an enterprising official of the firm of International Combustion, Ltd., at London, England. To save the time and expense of constant interchange of cables, this business man sat at his telephone and talked simultaneously with fellow-executives at Sydney, Melbourne, Perth and Adelaide, Australia; Johannesburg, South Africa; Calcutta and Bombay, India; New York City and Paris, France.

F. C. Usher said that as clearly and as undistorted as if they were telephoning from across the street, came back the voices from the ends of the earth, answering the questions asked from their head offices. This conference is expected to be the forerunner of others.

YOU CAN'T GO WRONG with NATIONAL NICOPRESS SLEEVES

.... with them your men will easily make uniform, unbreakable air-and-moisture-proof Line Joints

You will find that the National Nicopress method of making line joints coincide exactly with the highest standards set up. For instance:—

Nicopress Joints are easily made. Installation is fast. You'll make more splices in a given time with Nicopress than by any other method.

All splices are uniform. Any lineman can easily make workmanlike joints.

Nicopress Line Joints are stronger than the wire and have great tensile strength.

Nicopress splices will *not* break—the wire will not pull out.

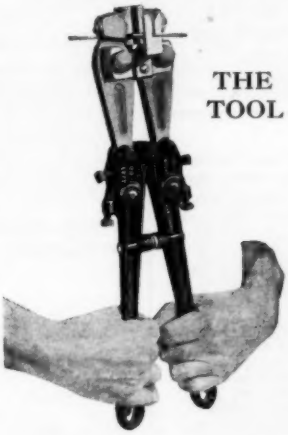
Completed Nicopress Splices are smooth, allowing wire to pull easily without snagging.

Because Nicopress Splices are perfectly tight they are absolutely proof against air and moisture. Corrosion cannot set in.

In Nicopress Splices the resistance is low and many tests have proven that the conductivity is actually increased.

Nicopress sleeves are exact to size.

The Nicopress tool is convenient to handle and practical in size, easily operated by any lineman either on the ground or in the air.



THE TOOL

Nicopress tools are rugged and durable and will stand up indefinitely, can be easily adjusted by operators when necessary.

Above all the Nicopress method of making line joints is extremely practical, economic and efficient under any conditions, ideal or in times of stress and emergency.

Write today for prices and full detail information.

The Completed Spice

THE NATIONAL TELEPHONE SUPPLY COMPANY
5100 Superior Ave., Cleveland, Ohio

If it's a SPLICE make it a NATIONAL NICOPRESS

Crapo
GALVANIZED PRODUCTS

Seven Wire Steel Strand

Telephone and Telegraph Wire

Crapo Galvanized Steel Strand is quickly, easily and economically served. Its *pure zinc* coating is so adherent and so ductile that it withstands vigorous bending and twisting without cracking or peeling. This insures corrosion-resisting joints, longer years of service, lower maintenance costs.

Crapo Galvanized Seven Wire Steel Strand and Telephone and Telegraph Wire are available in all standard grades and sizes.

Indiana Steel & Wire Co.
Muncie, Indiana

Informational Advertising Of Ohio Company

The Athens Home Telephone Co., Athens, Ohio, of which Dr. C. L. Jones is general manager, recently brought the matter of taxes home to the people of the community it serves in an effective way. In the local newspaper of December 28 it ran a four-column advertisement entitled "Taxes vs. Efficient Public Service."

As the matter of taxes is of increasing importance to telephone companies the advertisement is reproduced on this page. It will be noted that the public's interest in the taxes paid by the telephone company is the point stressed. It is summed up in this question: Shall the telephone service continue to be efficient or shall it be allowed to deteriorate? Note, also the invitation extended to "telephone borrowers" to have a telephone of their own. It's a good hint.

"TELEPHONY" INDEX READY

The index for Volume 107 of "Telephony," which was completed with the issue of December 29, 1934, is now ready for distribution among those who keep complete files.

All of the important articles which appeared between July 7 and December 29, 1934, are listed in this index. It will be supplied free of charge to those making application.

THEY STAND THE "GAFF"

YEARS of satisfactory service under all conditions of anchor guying have proven the dependability of Eversticks. Their great strength and holding power, plus ease and speed of installation are reasons why they are preferred by construction and maintenance engineers the country over.

Everstick Anchors offer a complete line of guy anchors in 2-way, 3-way and 4-way expanding types. All are made of certified malleable Iron. Write for bulletin No. 1033 describing this complete line of Everstick Anchors and Pole Line Specialties.

EVERSTICK ANCHORS...

TAXES vs. Efficient Public Service

The Following 11 Kinds of TAX Paid by the Home Telephone Co. During 1934 Totaled $18,300.00

viz:

COUNTY TAX
INCOME TAX
EXCISE TAX
POOR RELIEF TAX
TOLL MESSAGE TAX
CAPITAL STOCKS Tax
LIABILITY INS. TAX
AUTO TAG TAX
PUB. UTILITY TAX
CHECK TAX
GASOLINE TAX

The 170 local Stockholders whose money made good Telephone service available in Athens extend

GREETINGS of the SEASON

to all supporters and patrons of this institution.

To the hundreds of those who are getting their daily Telephone service free from their neighbor's Telephone may we hope that you will soon be able to have a Telephone of your own.

Question: Should a local Utility Company be made a tax collecting institution or should it be permitted to spend its spare cash and the available time of its employees in improving and stabilizing the service it has to sell? Since service is its only salable product why should it be anything but the best that money and effort will produce?

All during the Depression some 40 families in and about Athens have been maintained through continuous employment furnished by the Telephone Co. as against being laid off and thrown on the relief agencies.

If the present tendency to soak all "Utility Concerns" continues, the above admirable situation is sure to cease, as taxes will absorb all available moneys used in the past to keep two or three gangs of men and trucks at work on repairs. Good Telephone service can't be assured any other way.

Athens enjoys as modern Telephone service as any city in Ohio today.

Question: Shall it continue to be efficient or shall it be allowed to deteriorate?

Athens Home Telephone Co.

Christmas Season Advertisement of Athens Home Telephone Co., Athens, Ohio, Which Discusses Taxes from the Public Interest Standpoint.

Glass Block Illuminates Unattended Dial Exchange

AN answer to certain problems associated with the construction and operation of unattended telephone exchanges has been found in the use of the newly-developed glass building block.

The isolated rural exchange of this character must necessarily be windowless, to eliminate the possibilities of leaks and to guard against invasion by prowlers. Yet an interior into which the daylight enters is a distinct advantage to those who enter the exchange to execute necessary repair work. The translucent wall provided by complete or partial use of glass-block construction fulfills all of these requirements.

The walls were carried to an arbitrary height and topped off with several rows of glass building block to permit the infiltration of light into the structure without the introduction of windows and their cost. Then the entire structure was topped off with a simple roof. In this case the glass block is serving as a load-bearing material, in that through the medium of the block the weight of the roof is carried.

This exchange building, erected at a very low cost, is as nearly permanent a structure as it is possible to build. No painting is required of sash and sills, for no windows exist. The only attention the glass blocks require is an occasional washing and because of the clean surroundings of this particular exchange, this will be necessary only at infrequent intervals.

The glass block is about twice the size of an ordinary brick, and it is said that it can be laid by a regular mason without any special training. The blocks have hollow centers, hermetically sealed, the central air-chamber acting as an insulator against heat and cold. Furthermore, the material of the block affords perfect electrical insulation.

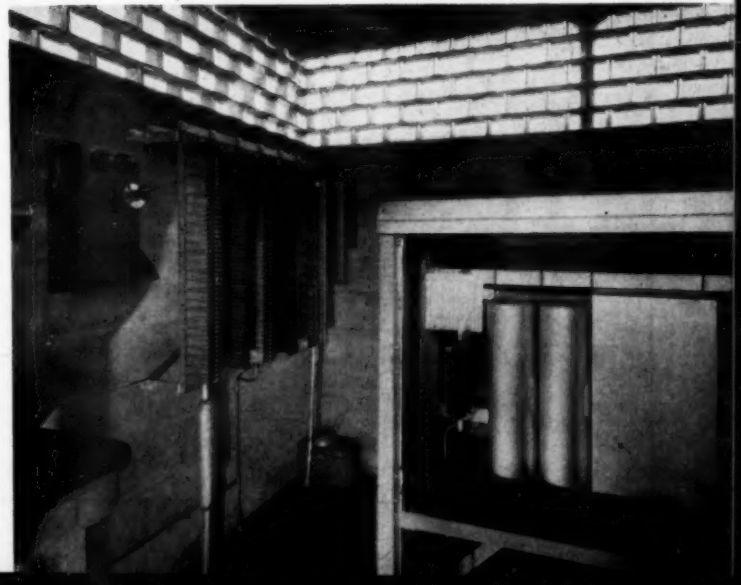
The application of color to the surfaces of the block that come into contact with the mortar makes a wide range of decorative color possible in this material. The weather side of the block as well as the interior face are plain glass surfaces, easily kept clean and free from dust.

A soft diffused light filters through the block giving adequate lighting to the interior of the structure by daylight, and providing an excellent working light for those who take care of the exchange.

This glass block is a material developed through long experimentation by the Owens-Illinois Glass Co. of Toledo, Ohio. It has been on the market as a perfected building material for more than two years and has given satisfactory service in many types of commercial and industrial structures. The glass block building at Chicago's recent A Century of Progress Exposition demonstrated the practicability of its use for the entire walls of a large structure.

Unattended Dial Exchange Erected Recently at Springville, Pa., by Commonwealth Telephone Co.—Illumination Afforded by Use of Translucent Glass Block for Upper Part of Wall.

The Commonwealth Telephone Co. has erected such an unattended exchange at Springville, Pa., using glass blocks for the upper part of the wall, as is shown in the illustrations presented on this page. The exchange is a very simple structure, consisting of a mat foundation which at the same time suffices as the concrete floor. The four walls of the building are of hollow tile with cement plaster or stucco applied to the exterior of the structure.



View of Interior Made by Daylight Which Filters Through the Glass Blocks.

The succeeding pulses of electricity which follow the initial pulse will be either equal to, greater, or less in magnitude than the initial pulse, depending on the phase relationship. The relationship between the voltages at any instant on a long line can be determined by the wave length equation previously cited, viz.: $\lambda = V/F$

For example, if a 1,000-cycle oscillator is connected to an open wire line 175 miles in length, then at the instant the oscillator is passing through the 90-degree phase angle, the voltage would be positive and maximum at the terminals of the line, zero at a point 43.75 miles out, maximum and negative at a point 87.5 miles out, and positive and maximum at the end of the line. A line 175 miles in length would be one wave length long at 1,000 cycles.

Fig. 7 illustrates the instantaneous current relations on a telephone line which is one wave-length long. It should be

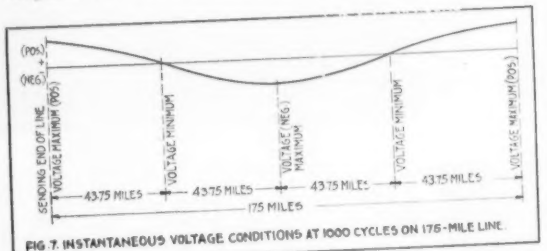


FIG 7. INSTANTANEOUS VOLTAGE CONDITIONS AT 1000 CYCLES ON 175-MILE LINE.

particularly noted that the phase relationship is different at various points along the line and that the magnitude of the wave is successively reduced because of line attenuation.

Telephone and power line transposition schemes recognize the phase shift and attenuation characteristics of lines by spacing transpositions at frequent enough intervals as to eliminate the lack of symmetry that would otherwise result in the two elemental parts of a transposition section being unbalanced because of the two effects mentioned. Were it not for these effects, both power and telephone transpositions could be spaced at much longer intervals.

Where impedance irregularities exist on a line and cause part or all of the energy present in a normal wave to be reflected back to the source of the normal wave, the resulting intraction of the two waves, as previously explained, creates, in effect, a "standing wave" on the line.

This standing wave does not change in value (for a given frequency) from instant to instant; hence, if a voltmeter were placed across the line at different locations, regardless of time, readings would be had varying from zero to some maximum value. This "standing wave" condition, due to wave reflection phenomena, should not be confused with the "instantaneous wave" condition.

Telegraph Over Telephone Lines

Most every business has its by-products. In the telephone business one of the by-products is the use of telephone lines for telegraph service. Telegraph service fits into the telephone picture in three ways:

1. It may be used as a means of communication between toll line test boards, enabling company communications to pass back and forth without utilizing the regular voice channels.

2. Telegraph news or market service can be leased to telephone subscribers and handled over regular telephone toll circuits without interfering with the regular use of these circuits.

3. In connection with the trend toward telephone companies acting as agents for the leading telegraph companies, the necessary telegraph channels can often be provided over existing telephone circuits without impairing the usefulness of the latter.

The printing telegraph or teletypewriter makes possible telegraphic communication without the necessity of a trained telegraph operator; hence, telephone companies can now handle telegraph traffic without added personnel.

This data sheet discusses the several methods of deriving telegraph circuits from telephone circuits, and the types of telegraph systems normally used in conjunction with these derived circuits.

Simplex Derived Telegraph Circuit

There are two principal methods in use for deriving telegraph channels from regular telephone circuits. These are known as the *simplex* and the *composite* methods.

The simplex method is the simplest of the two schemes and permits obtaining one telegraph circuit from each me-

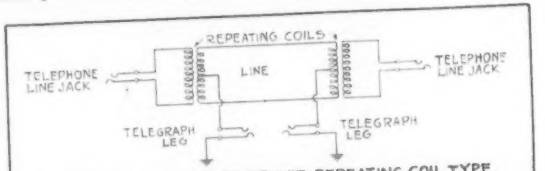


FIG 1. SIMPLEX TELEGRAPH CIRCUIT - REPEATING COIL TYPE.

tallic telephone line. The theory of this method is similar to that of a "half or grounded" phantom telephone circuit. Fig. 1 illustrates the circuit of a simplex telegraph channel.

It will be seen (Fig. 1) that the grounded telegraph circuit is connected to the midpoint of a repeating coil which is inserted at the terminals of the telephone line. Telegraph currents, therefore, pass through the two halves of the coil in opposite directions; hence, they induce no voltages across the primary winding of this coil.

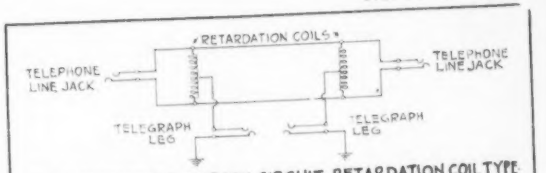


FIG 2. SIMPLEX TELEGRAPH CIRCUIT - RETARDATION COIL TYPE.

After passing through the repeating coil, the telegraph currents flow over the two line wires in the same direction and at the distant receiving point flow toward the midpoint of the repeating coil and out over the telegraph leg to ground.

If the line wires are well-balanced to ground, the telephone currents will, of course, be confined to the line wires and will not flow to ground.

It will be seen that the principle of the simplex telegraph circuit is practically identical to that of the half or grounded phantom telephone circuit.

Now, it should be understood that the term "simplex" refers only to the method of obtaining a telegraph circuit and not to the type of telegraph system used. A simplex circuit might be used for a simple telegraph system, a duplex system, etc.

An alternative method from that shown in Fig. 1 is shown in Fig. 2. This method derives a simplex telegraph circuit by the use of a center-tapped inductance placed across the

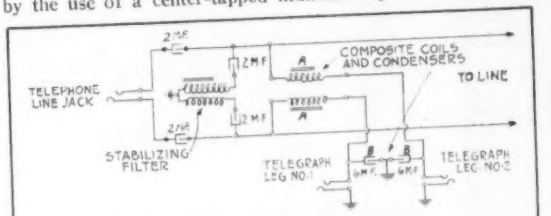


FIG 3. COMPOSITE TELEGRAPH CIRCUIT.

telephone line as shown. The inductance used must be of such value as to offer a fairly high impedance to voice-frequency currents and only a small impedance to telegraph currents. Of the two methods the repeating coil method is generally used.

Composite Telegraph Circuit

Using the composite method of obtaining telegraph circuits over telephone lines, it is feasible to derive two grounded telegraph circuits from one metallic telephone line. Fig. 3 illustrates the basic circuit of a composited telephone line.

The Operators' Corner

By MRS. MAYME WORKMAN
Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

LACK of appreciation and a desire for possession is not conducive to happiness. The calendar does not make a New Year; but what we think and do. No. 176

AS the New Year dawns, we pause to wonder what it will hold in store for us. Will it bring joy and happiness or sorrow and disappointment? Will we be prosperous or will the Big Bad Wolf be howling at our door?

Many good New Year's resolutions will be made, and, as usual, most of them will be broken. However, there is one resolution we all can and should make: to appreciate our daily blessings, for we are all blessed with the basic riches of life, family and friends—the privilege of living in a country of unbounded opportunity and potentialities.

Each year we are given a book containing 365 pages upon which we will daily make our mark and write our autobiographies. What will the story be when the last page has been written? Each creature is also given the same amount of time in a given span of an hour or a year. We are given our checks on the Bank of Life, and we must cash our checks when they come due; we cannot antedate or postdate. We cannot exchange them or borrow on them.

As we add year to year, we are reminded of a string of add-a-pearls. With each year of increased activity the size of the pearl grows and it is our purpose not only to add larger pearls, but jewels of perfection.

Much unhappiness in the world is due to lack of appreciation and a desire for possession. There are so many things to enjoy in life without possessing them; the moonlight, the sunset, and all the other beauties of nature. And who among us would be so selfish as to desire any of these wonders of nature for our own exclusive enjoyment?

We often hear the expression, "she was as happy as a child!" And why are children usually happy? Because they appreciate their possessions. Haven't you seen children enjoy a ten-cent toy more than an expensive one? Children do not value things in dollars and cents. We would all be so much happier if we would be grateful for what we have and thoroughly enjoy our possessions.

As we stand on the threshold of this New Year we might well consider the words of Albert Einstein: "Strange is our situation here upon earth. Each of us comes for a short visit, not knowing why, yet sometimes seeming to divine a purpose.

"From the standpoint of daily life, however, there is one thing we do know; that man is here for the sake of other men—above all for those upon whose smile and well-being our own happiness depends, and also for the countless unknown souls with whose fate we are connected by a bond of sympathy.

"Many times a day I realize how much my own outer and inner life is built upon the labors of my fellow men, both living and dead, and how earnestly I must exert myself in order to give in return as much as I have received. My peace of mind is often troubled by the depressing sense that I have borrowed too heavily from the work of other men."

And so as we step over the threshold of 1935, let us look to the future with mental equilibrium, realizing the facts of life, anticipating its unalterable laws which cannot be abrogated, and seeking the opportunities which are ever present. Remember, the calendar does not make a New Year; but what we think and do ourselves.

Questions from Illinois Operators

1. When calling a pay station, why does the operator always say "postpay" before she rings?
2. Why do appointment calls take a higher rate?
3. What phrase do you use when a party, placing a long distance call, does not give the number of the telephone from which he is calling?
4. What is the difference between a "locate ticket" and an "indefinite address" ticket?
5. Does a station-to-station collect 10-cent call take the person-to-person time as well as the rate?

For the answers to these traffic questions please turn to page 34.

A Good New Year's Resolution

For You

Mr. Telephone Manager

Resolve to Equip Your Plants with

Cook Terminal

and

Protection Equipment

To properly distribute your facilities—safeguard your investments and reduce your maintenance cost.

COOK

Cook Electric Co.

CHICAGO

COMMISSION AND COURT NEWS

(*Concluded from page 24*)

gave the commission authority to regulate the construction, maintenance and operation of these lines, and comprehensive rules were drawn up.

Since that time the number of cross-country wires has greatly increased, and it is desirable, in the interest of public safety, to revise and bring the codes up to date. The only provision in the statutes relating to the height is one which provides for a minimum distance of 25 feet above the rails.

• • •

New Rate Schedules Filed by Bell in Missouri

New schedules modifying rates for nine types of miscellaneous telephone service, chiefly in Kansas City, Mo., and nearby towns were filed with the Missouri Public Service Commission on December 18 by the Southwestern Bell Telephone Co. The company estimated the tariff revisions would result in reduction of about $17,500 a year to about 3,700 users.

After the new schedules were filed the commission dismissed a case for investigation of the reasonableness of charges by the company for incidental and auxiliary equipment and services. This inquiry applied to rates for special telephones, special mountings, buzzers, switches, relays, extension bells, loud ringing bells for customers with defective hearing and rented telephone booths.

Six of the rate changes for miscellaneous service make rates in Kansas City, North Kansas City and Independence, for special services, conform to such rates elsewhere in the state. The services involved are extension gongs, buzzers, push buttons, alternate directory listings and headband receivers. These changes affect about 3,000 customers and would reduce their rates about $1,000 a month it was said.

The other three rate changes, effective for all Missouri exchanges of the company, apply to about 7,000 users of outdoor wall telephones, and special telephones for persons with defective hearing.

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Commission Rulings and Schedule of Hearings

FEDERAL COMMUNICATIONS COMMISSION
TELEPHONE DIVISION
WASHINGTON, D. C.

December 20: Order issued requiring class A telephone companies to answer questionnaire as to use of free service or service at less than regular rates during 1934. Companies ordered to keep records in such a manner that they may be able to furnish the commission this information for any month or months subsequent to December, 1934, as requested. Original records ordered kept until their destruction is directed by the commission. No. 6-A.

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D. C.

January 21: Hearing at which 11 officers of communications companies are required to appear and show cause why they should be permitted to continue to serve as officers or directors of more than one common carrier.

ALABAMA

December 28: Petition filed by Alabama Rate Association seeking a 25 per cent reduction in telephone rates throughout the state.

FLORIDA

February 5: Tentative date for final hearing in Tallahassee in the state-wide telephone rate investigation.

KANSAS

December 11: Permission granted the Southwestern Bell Telephone Co. to reduce from $1 to 50 cents the charge for restoration of service discontinued for non-payment of bills in cities where there are 2,000 or less telephone stations.

KENTUCKY

December 13: Commission took under discussion a request of the Ashland Home Telephone Co. to have the recent order of the commission, abolishing extra charges for desk-set telephones apply only to straight lines and allow it to make the charge on party lines.

The Ashland company, through J. E. Albert, of Columbus, Ohio, pointed out that if the ruling stood as given out by the commission, it would cause it to make a capital outlay of approximately $50,000 during the next few months to replace nearly 1,300 wall telephones now used by party-line subscribers.

Those attending the hearing included Mr. Albert, George Northington, of Columbus, Ohio; Kelly McNish and F. C. Malin, representing the Ashland company; D. H. Lloyd and J. A. Sullivan, of the Lexington Telephone Co., and C. V. Bridwell, of the Southern Bell Telephone & Telegraph Co.

MICHIGAN

January 8: Hearing in Lansing in an investigation of the rates of the Michigan Associated Telephone Co. The city of Sturgis is the chief complainant, having filed a petition with the commission July 27. Other cities concerned in the matter of lower rates include Muskegon, Muskegon Heights and Hart.

MISSISSIPPI

January 15: Hearing on citation of commission against all telephone companies in state to show cause why they should not reduce local exchange rates.

MISSOURI

December 18: New rate schedules for miscellaneous services filed by Southwestern Bell Telephone Co., applicable chiefly in Kansas City and nearby towns.

MONTANA

December 5: Authority granted the Eureka Telephone Co., of Eureka, to discontinue 6.8 miles of its telephone line in the rural territory between Gateway, near the Canadian border, and Roosevelt Junction.

The petition was filed by the company some time ago and a hearing held on the application. Evidence was produced by the company that there were but two customers on the line, that the line was old and dilapidated, that it must be either abandoned or rebuilt, and that the revenue from the line was practically nil.

NEW YORK

January 4: Hearing in New York before Assistant Counsel H. M. Chamberlain on motion of the commission as to the telephone service furnished by the New York Telephone Co. to H. Richard Panzer at Hastings-on-Hudson.

TENNESSEE

December 27: Order issued reducing rates of Southern Bell Telephone & Telegraph Co. 10 per cent or approximately $500,000 annually. The reduced rates after the January billings.

WISCONSIN

December 28: Voluntary emergency reductions by four telephone companies were extended to save 904 customers $1,783 in the next year under orders issued by the commission.

Independence Telephone Co., $120 for 217 customers; the Markesan Telephone Co., $783 for 261 customers; the Grand River Telephone Co., $615 for 205 customers; and the Weyauwega Telephone Co. $265 for 221 customers.

COMING CONVENTIONS

Minnesota Telephone Association, Hotel Lowry, St. Paul, January 29, 30 and 31.

Nebraska Telephone Association, Hotel Lincoln, Lincoln, February 13 and 14.

Iowa Independent Telephone Association, Hotel Fort Des Moines, Des Moines, February 26 and 27.

Wisconsin State Telephone Association, Park Hotel, March 5, 6 and 7.

Ohio Independent Telephone Association, Hotel Deshler-Wallick, Columbus, May 1 and 2.

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Buyer's Weekly Guide

A list of firms and companies offering equipment, supplies or services for operating telephone companies

ADDING MACHINES

Burroughs Adding Machine Company, Second Blvd., Detroit, Mich. — Adding, Bookkeeping, Calculating, Billing and Accounting Machines, Electric Carriage Typewriters, Standard Typewriters, Operator Correct-Posture Chairs. Burroughs machines are in use today in hundreds of progressive telephone companies throughout the country.

BATTERIES—DRY CELLS

Bond Electric Corporation, 257 Cornelison Ave., Jersey City, N. J.—Bond Telephone Dry Cells, Bond Flashlights and Batteries, Industrial Flashlights and Batteries, Bond Dry Batteries, Storage Batteries, Voltpruf Special Flashlights for linemen, Victor Telephone Cells and Bond Formula 1216 Inhibitor, ideal for keeping the cooling system of trucks and service cars free from rust, scale and corrosion.

National Carbon Company, 30 E. 42nd St., New York.—"Columbia" Telephone Dry Batteries; "Eveready" Flashlights, Flashlight Batteries and Long Life Dry Cells, "National Pyramid" brushes, carbon, graphite and metal graphite for motors, generators and rotary converters. "Eveready" Prestone anti-freeze; "Eveready" Rustone rust preventive; and "Eveready" Air Cell telephone operators' transmitter batteries.

Ray-O-Vac Company, Madison, Wis.—Ray-O-Vac telephone batteries — longer life and better service proven by tests in accordance with U. S. Government standards and records of users. Ray-O-Vac flashlights and industrial flashlight batteries are other items showing Ray-O-Vac's outstanding quality.

BATTERIES—STORAGE

The Electric Storage Battery Company, Allegheny Ave. and 19th St., Philadelphia, Pa.—Exide Storage Batteries. Branches: Boston, New York, Rochester, Philadelphia, Pittsburgh, Washington, Atlanta, Cincinnati, Cleveland, Detroit, Chicago, Kansas City, Minneapolis, St. Louis, Denver, San Francisco and Seattle.

BATTERY CHARGING EQUIPMENT

General Electric Company, Bridgeport, Conn.—Tungar battery chargers. G-E pole line hardware. Cable filling compound.

CABLE—LEAD ENCASED

British Insulated Cables, Ltd., Surrey House, Embankment, W. C. 2, Factory: Prescot, Lancashire, England.—Telephone cable of all sizes and capacities.

General Cable Corporation, 420 Lexington Ave., New York, N. Y.—Paper telephone cables of standardized manufacture for over forty years. Weatherproof and insulated copperweld drop wire.

Eugene F. Phillips Electrical Works, Ltd., Montreal, Can.—For any type of wire or cable used in telephone, telegraph or power work get in touch with "Phillips." Manufacturers of bare and insulated copper wires, rubber insulated wires, enameled wire, magnet wire, telephone cables, power cables, switchboard cables, flexible cords, copper rods, etc.

CABLE RINGS

National Telephone Supply Company, 5100 Superior Ave., Cleveland, Ohio.—National Cable Rings, National Splicing Sleeves, Non-Breakable Messenger Cable Hangers, Marlin and Swisher Cable Hangers and Custom Galvanizers. National cable rings are practical because they are two-way,—they allow the cable to be pulled in either direction. National sleeves make secure the weakest points in the line. If it's a splice—make it a National.

CABLE TERMINALS

Cook Electric Company, 2700 Southport Ave., Chicago, Ill.—Protective Pole Cable Terminals, Unprotected Pole Cable Terminals, central office protection, lightning arresters, sleeves, fuses.

Reliable Electric Company, 3145 Carroll Ave., Chicago, Ill.—A complete line of telephone and switchboard protectors and specialties. All sizes of cable grips.

CARBON DIAPHRAGMS

Noris Carbon Company, Inc., 160 5th Ave., New York, N. Y.—Carbon diaphragms, carbon back plates, granular and globular carbons, lightning arresters.

CONDUIT

Brazil Hollow Brick & Tile Company, Brazil, Ind.—Makers of Brazil Vitrified Tile Conduit.

CORDS, CABLE AND WIRE

Lenz Electric Manufacturing Co., 1751 N. Western Ave., Chicago—Established 1904—telephone and switchboard cords for all makes of equipment, braided and lead-covered telephone cable, flame-proof jumper wire, interior telephone wire, switchboard wire.

CORDS AND WIRE

Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago—Telephone and Switchboard Cords, Flame-proof Jumper Wire, Switchboard Wire, Interior Telephone Wire. W. L. Runzel, President, has devoted over 40 years to the making of fine telephone cords.

ELAPSED TIME RECORDERS

Calculagraph Company, 50 Church St., New York, N. Y.—Calculagraph is the world's standard elapsed time recorder and gives you toll records printed with elapsed time to the second. Both spring driven and electric motor models are available.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

Alfred E. Cowling, Scotstown, Quebec.—Eastern cedar poles, plain or butt treated.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

Michigan Pole & Tie Company, Newberry and Grand Rapids, Mich. — "Poles with Character." Northern White and Western Red Cedar. Strategically located yards, Minneapolis, Minn., and Reed City (Lower Michigan), insure quick deliveries.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada — Western Red Cedar Poles. Plain or Butt treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or Butt Treated.

SUPPLIES, SWITCHBOARDS AND INSTRUMENTS

Automatic Electric Company, 1033 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Telephones, relays, signaling and control equipment.

Automatic Electric Company, Ltd., Milton Road, Edge Lane, Liverpool, England.—Automatic Telephone Equipment.

Automatic Electric Sales Company, Ltd., 1027 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Manual Telephone Equipment, telephones, storage batteries, wire, cable, poles, etc.

Kellogg Switchboard & Supply Company, Adams & Aberdeen Sts., Chicago, Ill.—Engineers and designers, manufacturers and suppliers of complete equipment for telephone exchanges and communication systems. Manufacturers of "Master-built" Common Battery, Magneto and PBX Switchboards, "Masterphone" Telephone Instruments, and a complete line of telephone supplies, including bronze drop and interior wire.

North Electric Manufacturing Company, Galion, Ohio—Machine switching telephone systems. Automanual and Automatic. "All-Relay" Switching Apparatus (Dialless and Dial Control). Unattended Satellite Systems.

Siemens Brothers & Company, Ltd., Woolwich, England—Automatic and Manual Telephone Equipment.

Stromberg-Carlson Telephone Manufacturing Company, 100 Carlson Road, Rochester, N. Y. — Telephone apparatus of all kinds, switchboard cords, cable and general telephone supplies.

TOOLS

Crescent Tool Co., Jamestown, N. Y.—CRESTOLOY Pliers, Curved Needle Nose Pliers, Heavy Diagonal Cutting Pliers, Linemen's Side Cutting Pliers, End Cutting Nippers, Crescent Hack Saws.

TRANSMITTER REPAIRS

The Telephone Repair Shop, 1760 Lunt Ave., Chicago, Ill.—Transmitters completely rebuilt and arranged for either magneto or C. B. service. Transmitter fronts and backs refinished in black. Transmitter buttons cleaned and refilled. Receivers repaired; ringer coils and generator armatures rewound.

CLASSIFIED SECTION

Rates 10 cents per word payable in advance. Minimum charge $2.00 for 20 words or less.

RECONSTRUCTED EQUIPMENT

Western Elec. No. 46 Common Battery Induction Coils @ $0.55

Kellogg No. 79 Common Battery Ind. Coils @ ..... .45

Stromberg-Carlson No. 27A Receiver with repolished shell and New Cord @.... 1.10

Western Elec. No. 143 Receiver with repolished shell and New Cord @..... 1.00

Kellogg No. 41 Slip type Receiver with repolished composition Shell and New Cord @ 1.10

Am. Elec. slip type Receiver with repolished shell and New Cord @..... .85

Kellogg No. 118 desk set with Dean. Trans. and Rec., complete with W. E. No. 240 3-bar 1000-1600 or 2500 ohm external post connection signal set @ 7.50

Kellogg No. 2696 type 4-bar 1000 or 1600 ohm Bdg. Compacts @ 8.00

Kellogg No. 97 C. B. desk set with No. 75 Straight line steel bell box @..... 7.00

Write for Bulletin No. 106

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1940 W. 21st St., Pilsen Station
Chicago, Ill.

CORRESPONDENCE COURSES FOR TELEPHONE MEN

Course No. 112—ELECTRICAL ENGINEERING—Very complete and understandable. Comparable with college course. Complete, $10.50.

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Any quantity, one or one thousand.

Baked, black, velvet finish, New granular carbon. Workmanship, adjustments and tests made with the latest and most improved apparatus. 50c each less backs.

Full information on request.

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Have your old telephones modernized by us into late type wall or desk telephones which give you many years of service at a substantial saving.

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Send us your repair work for transmitters, receivers, generators, coils, etc. *Prompt Service.*

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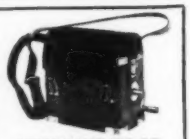
Lineman's test set with finder coil for locating distance and direction to trouble. Sent on trial.

$31.00



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FOR SALE

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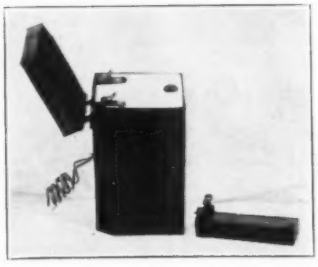

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POSITION WANTED

POSITION WANTED—By capable telephone man with eighteen years' experience, plant and commercial. Can furnish satisfactory references. What have you? Address 8398, % TELEPHONY.

Directory Title of "Hon." Provokes Discussion

Examination of the newly-issued telephone directory of the Chesapeake & Potomac Telephone Co. for the city of Washington, D. C., has provoked animated discussion in capital circles as to the manner in which the title "Hon." is bestowed on a sprinkling of the great and near great. Needless to say, the telephone company disclaims any intention of setting itself up as social arbiter in the matter.

Examination of the listings indicates that six justices of the Supreme Court of the United States have the title, while three of them do not. Two members of the President's cabinet have it, while the three others who are listed have not. Representatives of the telephone company, when questioned in regard to the matter, said that the listings are made as requested by subscribers.

Examination of the congressional directory shows the only man who rates the title "Hon." in its pages is the minister from Canada, the Hon. William Duncan Herridge, K. C., D. S. O., M. C.

There is one man in the telephone directory who comes by the title by birth. That is Hon., Edgar E. He lives in Hyattsville and is listed on page 228 of the Washington book.

Answers to the Traffic Questions on Page 31

1. To let you know that the called number is a coin-box station. If your call is collect, it will be necessary for you to reach the TTC TX and pass your ticket to her so that she may time the call and collect the amount of the charge. As you know, a call cannot be charged to a coin-box station.
2. Appointment calls take the same rate as a person-to-person call as they require approximately the same amount of operator's work time.
3. Say, "Your number, please?"
4. A "locate" ticket is a call on which the calling party specifies more than three stations at the same toll center at which the called party may be reached. An "indefinite" address ticket is a call on which the address is so indefinite that there are likely to be several such concerns at the called place, for example, principal hotels, principal garages, etc.
5. Yes.